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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/801,542	03/07/2001	Niklas Bondestam	ASMMC.030AUS	5705

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EXAMINER

MARKHAM, WESLEY D

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Notice of Allowability

Application No.

09/801,542

Examiner

Wesley D Markham

Applicant(s)

BONDESTAM ET AL.

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the RCE and amendment filed on 2/3/2005.
2. ☒ The allowed claim(s) is/are 35,37-48,50-52 and 54-57.
3. ☒ The drawings filed on 07 March 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date attached.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

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EXAMINER'S AMENDMENT / ALLOWANCE

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application on 2/3/2005 (with a certificate of mailing dated 1/31/2005) after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission / amendment filed on 2/3/2005, in which independent Claims 35, 44, 50, and 57 were amended, has been entered.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Rabinder Narula on 2/24/2005.

The application has been amended as follows:

In the specification:

The paragraph beginning on page 1, line 5, has been amended to read, --This application is related to U.S. Application Nos. 09/769,562 filed January 25, 2001, now

Art Unit: 1762

U.S. Patent No. 6,579,374, and 09/568,077 filed May 10, 2000, now U.S. Patent No. 6,562,140.--

In the claims:

Claim 53 has been canceled.

53. (Canceled)

Claims 44 and 50 have been amended as follows:

44. (Currently amended) A method for growing a thin film on a substrate by exposing the substrate in a reaction chamber defined by a plurality of chamber walls to alternate surface reactions of vapor-phase reactants, comprising:

loading the substrate onto a substrate support structure inside the reaction chamber;

maintaining the substrate support at a first temperature within [[an]] a first ALD temperature window by means of a first temperature controller;

maintaining at least portions of the chamber walls that are exposed to the vapor-phase reactants at a second temperature different from the first temperature by means of a second temperature controller, the second temperature being within a second ALD temperature window that encompasses the first ALD temperature window; and

Art Unit: 1762

alternately and sequentially feeding at least two vapor phase reactants into the reaction chamber;

wherein the second temperature is selected to lower a rate of atomic layer deposition (ALD) film growth upon the walls relative to the substrate; and

growing ALD film on the chamber walls at a lower rate as compared to the substrate.

50. (Currently amended) A method for preventing unwanted deposition on walls of an atomic layer deposition reaction chamber, comprising alternately and sequentially feeding at least two vapor phase reactants into the reaction chamber such that there is ALD growth on the substrate and the chamber walls while controlling a temperature of ~~[[a]]~~ the substrate and independently controlling a temperature of at least those portions of the chamber walls exposed to the reactants, such that both the temperature of the substrate and the temperature of the walls are within an ALD temperature window and a rate of deposition by self-limited atomic layer deposition on the substrate is maximized while self-limited atomic layer deposition (ALD) film growth on the walls is reduced relative to controlling a temperature of the substrate alone.

Reasons for Allowance

Claims 35, 37 – 48, 50 – 52, and 54 – 57 are allowed

The following is an examiner's statement of reasons for allowance: Independent Claims 35, 44, 50, and 57 are all drawn to an atomic layer deposition (ALD) method.

Art Unit: 1762

The claimed method comprises performing an ALD method in a reaction chamber while independently controlling the temperature of the substrate (or substrate support) and the temperature of the chamber walls. The temperatures of the substrate and the chamber walls are controlled such that both temperatures are within the ALD temperature window, but the substrate temperature is at a portion of the window at which the ALD film growth rate is increased or maximized relative to the ALD film growth rate on the chamber walls, which are at a less-optimal growth temperature within the ALD temperature window.

A summary of the closest prior art of record follows. Kim et al. (USPN 6,306,216) teaches a method for growing a thin film on a substrate by ALD (Abstract, Figures 2 and 4a, Col.1, lines 8 – 15, Col.2, lines 8 – 28, Col.4, lines 2 – 7 and 35 – 65, Col.5, lines 1 – 10, and Col.11, lines 13 – 25 and 41 – 45), the method comprising controlling a chamber wall temperature of at least those portions of the chamber walls that are exposed to vapor-phase reactants (Figure 2, reference number “400”, Figure 4a, reference numbers “705”, “705a”, and “705b”, Col.3, lines 49 – 52, Col.4, lines 18 – 21, and Col.8, lines 17 – 59), loading the substrate onto a support structure inside the reaction chamber (Figures 2 and 4a, Col.6, lines 43 – 67, Col.7, lines 1 – 16 and 60 – 67, and Col.8, lines 1 – 10), controlling a substrate support temperature independently of the chamber wall temperature (Figure 4a, reference number “702”, Col.8, lines 16 – 64, Col.9, lines 66 – 67, and Col.10, lines 1 – 14), and alternately and sequentially feeding at least two vapor phase reactants into the reaction chamber (Abstract, Col.4, lines 2 – 7 and 35 – 65, Col.5, lines 1 – 10, and Col.11, lines 13 – 25 and 41 – 45).

Art Unit: 1762

However, Kim et al. does not teach or reasonably suggest controlling the temperatures of the substrate and the chamber walls in the manner or to the conditions claimed by the applicant. Suntola et al. (USPN 6,015,590) and Sandhu et al. (US 2002/0195056 A1) generally teach heating the walls of an ALD reaction chamber in order to avoid condensation and "re-vaporize" reactant species that impinge on the walls. However, none of the prior art references, alone or in combination, teach or suggest the claimed method of independently controlling the temperature of the substrate and the temperature of the chamber walls in an ALD process such that both temperatures are within the ALD window, thereby growing an ALD film on both the substrate and the chamber walls, but at a lower rate on the chamber walls because the chamber walls are controlled to a less-optimal temperature within the ALD window than the substrate temperature is. For the above reasons, independent Claims 35, 44, 50, and 57 are allowed. Since the rest of the pending claims all depend from one of the aforementioned independent claims, these claims are also allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571)

Art Unit: 1762


272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


WDM

Wesley D Markham
Examiner
Art Unit 1762


TIMOTHY MEEKS
PRIMARY EXAMINER